PATENT ABSTRACTS OF JAPAN

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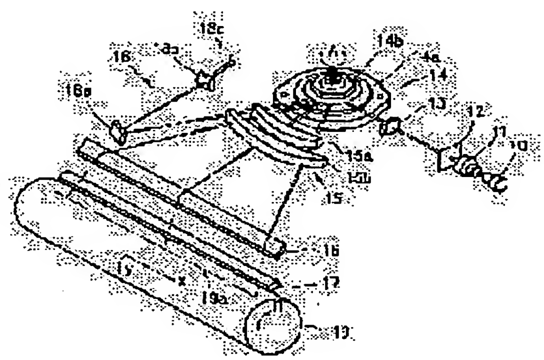
(54) IMAGE FORMING APPARATUS

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an image forming apparatus capable of surely forming the first synchronism detection signal even when a light intensity of a laser beam in a time period from starting of the emission to obtaining of the first synchronism signal is lower than that in the normal image forming time.
SOLUTION: A laser beam is emitted on a photosensitive body 19 such that it is expanded in a main scanning direction (x) by a polygon mirror 14b and is collected in a sub-scanning direction (y) by a second cylinder lens 17. The laser beam reflected by a synchronism detection mirror 18a is collected into an optical fiber 18c by means of a synchronism detection cylinder lens 18b and is subjected to photoelectric conversion by means of a PinPD on a control substrate to be converted to a synchronism signal. In this structure, when a laser diode is turned on for obtaining the initial synchronism signal from a stopping time of a scanning means, an optical intensity of the laser beam in a time period from starting of the emission to the first synchronism signal is set to a relationship of 'minimum optical intensity Pdt ≤ optical intensity Pld of the laser beam < minimum optical intensity Pim for manifesting the image'. As a result, it is possible to eliminate manifesting of the image of an electrostatic latent image due to a needless exposure line.



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CLAIMS

[Claim(s)]
[Claim 1] It is image formation equipment which develops the electrostatic latent image which is characterized by usually making reference voltage within the aforementioned synchronous detection means into a different value at the time of image formation in case a laser diode is turned on, in order to have the following and to obtain the first synchronizing signal from the time of a halt of the aforementioned scanning means, and which was formed in the scan layer-ed of the laser spot according to a predetermined electrophotography process. Optical on-the-strength control means which control the optical intensity of the laser beam injected from laser diode. A scanning means to scan the aforementioned laser beam. Image formation optical system which carries out image formation of the aforementioned laser beam to the aforementioned scan layer-ed as a laser spot. A synchronous detection means to generate the synchronizing signal which receives the aforementioned laser beam prepared in the position defined beforehand, and defines recording start timing.
[Claim 2] Image formation equipment characterized by considering as a value which is usually different from the time of generating the reference voltage within the aforementioned synchronous detection means using a D/A converter etc., and obtaining the first synchronizing signal from the time of a halt of the aforementioned scanning means with software in the image formation equipment of a claim 1 in the time of image formation.
[Claim 3] Image formation equipment characterized by making reference voltage within the aforementioned synchronous detection means into the value which usually differed from the time of obtaining the first synchronizing signal from the time of a halt of the aforementioned scanning means in the time of image formation by hardware in the image formation equipment of a claim 1.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] Especially this invention relates to the image formation equipment applied to digital KOPIA which has the laser scanning optical system using laser diode, a LASER beam printer, etc. about image formation equipment.
[0002]
[Description of the Prior Art] Conventionally, generally as for image formation equipment, high density and high speed are required. The demand of densification and improvement in the speed is becoming strong especially in recent years at the image formation equipment which has laser scanning optical system including a LASER beam printer. In order to meet the demand of this densification and improvement in the speed, it is necessary to raise the rotational frequency of the polygon motor which is a scanning means. The polygon motor dealing with high-speed rotation is developed by each motor maker now to meet this demand.
[0003] However, the problem that generation of heat of a bearing, a drive circuit, etc. will become large by this high-speed rotation correspondence, and the life of a motor will become short by this generation of heat has occurred. Moreover, since a polygon motor is rotated simultaneously with the power supply ON of a main part at the time of the normal operation of image formation equipment like a LASER beam printer and it continues rotating it henceforth to a power supply OFF, possibility that the life of a polygon motor will become below a main part life in that case arises.
[0004] Then, the method of using the early polygon motor of build up time, usually stopping a polygon motor, and making it rotate recently only at the time of image formation is also developed. According to this method, it becomes possible to develop the life of a polygon motor beyond a main part life.
[0005] Moreover, the synchronizing signal which defines recording start timing is needed for image formation. This synchronizing signal is generated by inputting a laser beam into the synchronous detection means prepared in the position defined beforehand, for example. In order to obtain the first synchronizing signal from the time of a polygon motor halt, after rotating a polygon motor and being in a regular rotation state first, a laser diode is turned on to arbitrary timing and it waits for the synchronizing signal from a synchronous detection means. Once, after detecting a synchronizing signal, fixed time Tw is counted from a synchronizing signal input, a laser diode is turned on after that, and a synchronizing signal may be repeated.
[0006] In this fixed time Tw, if a polygon motor sets Tl and laser diode lighting time for synchronizing signal detection to Td for the synchronizing signal input interval at the time of a regular rotation state, it will become [Tw=Tl-Td]. In here, as for the laser diode lighting time Td, it is common to set up so that the lighting start timing of a laser diode may be computed from the rotational speed of the geometric position by the optical-system layout of a synchronous detection means and a photo conductor and a polygon motor etc. and it may become the photo conductor field passage back in order to prevent degradation by unnecessary exposure of the photo conductor which is a scan layer-ed, and the imprint of a toner.
[0007] However, in order to obtain the first synchronizing signal from the time of a polygon

motor halt, in case a laser diode is turned on, at the time of a halt of a polygon motor, an angle of rotation may become eye an unknown hatchet and arbitrary lighting timing, and may expose a photo conductor by one line at the maximum.
[0008] Since in the case of the method which rotates a polygon motor simultaneously with a power supply ON several 10s will be taken before units other than optical system, such as a fixing unit, usually start from a power supply ON, about unnecessary exposure of a maximum of one line until it obtains the first synchronous detection, an electrostatic latent image will be eliminated according to an electric discharge process by preventing the imprint of a toner and rotating a photo conductor by turning off development. The time which this work takes becomes possible [starting optical system, by the time other units start, since it is about several / at most / s].
[0009] However, it leads to the fall of a throughput only at the time of image formation, and it is not desirable on a function. [of the time loss for several s by doing such work in the case of the method which rotates a polygon motor]
[0010] Moreover, when such work is not done, a toner is in an unnecessary exposure line, for example, in the case of the electrophotography process using the imprint roller etc., there is a possibility that an imprint roller may get and it may be connected with the dirt of a roller, as a result soiling on the back of a transfer paper, etc.
[0011] In order to avoid this, the optical intensity of the laser beam controlled by optical on-the-strength control means Pld, The minimum light intensity for the electrostatic latent image formed of the laser beam scanned by the scan layer-ed developing Pim, When the minimum light intensity required in order to generate a synchronous detection signal by the laser beam scanned by the synchronous detection means is set to Pdt, In order to obtain the first synchronizing signal from the time of a scanning means halt, in case laser diode is turned on, the image formation equipment characterized by making laser beam light intensity until it obtains the first synchronizing signal from a lighting start into [Pdt<=Pld<Pim] is invented.
[0012] A toner seems thus, not to be in the exposure for obtaining synchronous detection, if it controls.
[0013]
[Problem(s) to be Solved by the Invention] However, in such image formation equipment, in order to usually make laser beam light intensity until it obtains the first synchronizing signal from a lighting start smaller than the time of image formation, at the time of the dirt of a lens, and a system, the incident-light intensity to a control strip becomes weak by change etc., and it is accompanied by the problem with a possibility that a synchronous detection signal may be ungenerable.
[0014] this invention was made in view of such a point, and when usually making laser beam light intensity until it obtains the first synchronizing signal from a lighting start smaller than the time of image formation, it aims at offering the image formation equipment which can generate the first synchronous detection signal certainly.
[0015]
[Means for Solving the Problem] In order to attain this purpose, the image formation equipment of this invention The optical on-the-strength control means which are image formation equipment which develops the electrostatic latent image formed in the scan layer-ed of the laser spot according to a predetermined electrophotography process, and control the optical intensity of the laser beam injected from laser diode, A scanning means to scan a laser beam, and the image formation optical system which carries out image formation of the laser beam to a scan layer-ed as a laser spot, It has a synchronous detection means to generate the synchronizing signal which receives the laser beam prepared in the position defined beforehand, and defines recording start timing. In order to obtain the first synchronizing signal from the time of a halt of a scanning means, in case a laser diode is turned on, it is characterized by making reference voltage within a synchronous detection means into a usually different value from the time of image formation.
[0016] Moreover, it is good to consider as a value which is usually different from the time of generating the reference voltage within the above-mentioned synchronous detection means

using a D/A converter etc., and obtaining the first synchronizing signal from the time of a halt of a scanning means with software in the time of image formation.
[0017] Furthermore, it is good to make reference voltage within a synchronous detection means into the value which usually differed from the time of obtaining the first synchronizing signal from the time of a halt of a scanning means in the time of image formation by hardware.
[0018]
[Embodiments of the Invention] Next, with reference to an accompanying drawing, the form of operation of the image formation equipment by this invention is explained in detail. Reference of drawing 1 – drawing 8 shows 1 operation form of the image formation equipment of this invention. Change of change of the PinPD output according [accord / a synchronizing signal generation circuit / the block composition of a LASER beam printer and drawing 3 / in (a) / drawing 1 / of these drawings / drawing 4] to incident-light intensity in the composition of laser scanning optical system and drawing 2 and the synchronizing signal width of face according [(b)] to Vref is expressed, respectively. Moreover, the block of the example 2 of circuitry of an operation form is shown in the operation flow chart of the circuit, and drawing 7 , and the timing of the circuit of operation is shown in drawing 5 at drawing 8 at the block of the example 1 of circuitry of an operation form, and drawing 6 , respectively.
[0019] Drawing 1 shows the outline block diagram of the laser scanning optical system applied to the image formation equipment of this operation gestalt. This laser scanning optical system has laser diode 10, a collimate lens 11, aperture 12, the 1st cylinder lens 13, polygon motor 14a, polygon mirror 14b, the ftheta lens 15, the 1st mirror 16, the 2nd cylinder lens 17, synchronous detection mirror 18a, synchronous detection cylinder lens 18b, optical fiber 18c, a photo conductor 19, etc., and is constituted.
[0020] An excessive laser beam is cut in the laser beam study system constituted by above-mentioned each part by the aperture 12 with the slit section according to the size of the dot which the laser beam by which outgoing radiation was carried out from laser diode 10 is made parallel light with a collimate lens 11, and is formed.
[0021] It is condensed so that a laser beam may become a size predetermined in a photo conductor 19 top with the 1st cylinder lens 13, and it is scanned by polygon mirror 14b which rotates by polygon motor 14a at main scanning direction (the direction of a major axis of a photo conductor 19) x. And ******** is changed into uniform motion with the ftheta lens 15 of a couple, and a curvature of field is amended.
[0022] Next, the angle of a laser beam is changed by the 1st mirror 16, the 2nd cylinder lens 17 performs condensing to the direction y of vertical scanning (hand of cut of a photo conductor 19), and it irradiates on a photo conductor 19.
[0023] Moreover, it is condensed by optical fiber 18c by synchronous detection cylinder lens 18b, photo electric translation is performed by PinPD (not shown) of a control board, and the laser beam reflected by synchronous detection mirror 18a serves as a synchronizing signal.
[0024] The block block diagram of LASER beam printer 20 is shown in drawing 2 as an example of the image formation equipment using the above-mentioned laser criminal-investigation optical system. In drawing 2 , the image data sent to LASER beam printer 20 via printer I/F22 from the host PC 21 is sent to the printer engine 24, after being developed by bit map information by the printer controller 23. The image data transmitted to the printer engine 24 is changed into the ON/OFF signal of the laser diode which made the synchronizing signal 32 the start reference signal by the engine control section 25, and is irradiated via the optical unit 28 to a photo conductor 34. Image formation is performed according to a known electrophotography process after that.
[0025] Here, the minimum light intensity required in order to generate a synchronizing signal 32 by the laser beam scanned by Pim and the synchronous detection means 31 in the minimum light intensity for the electrostatic latent image formed of the laser beam scanned by Pld and the photo conductor 34 developing the optical intensity of the laser beam controlled by the optical on-the-strength control section 26 according to the electrophotography process 33 is set to Pdt.
[0026] In this composition, in order to obtain an early synchronizing signal from the time of a

scanning means halt, in case laser diode is turned on, laser beam light intensity until it obtains the first synchronizing signal from a lighting start is made into [Pdt<=Pld<Pim] by the optical on-the-strength control section 26. For this reason, development of the electrostatic latent image by the unnecessary exposure line is lost.
[0027] Change of the PinPD output according the example of composition of a synchronizing signal generation circuit to incident-light intensity and property change of the opposite time t of the synchronizing signal width of face by Vref are shown in drawing 3 again at drawing 4 . Vref1 and Vref2 of drawing 4 are the example of level of the strength of incident-light intensity. Moreover, the real diagram of half-ellipse type is usually property change at the time of image formation, and, similarly a dotted-line view is property change at the time of the first synchronous detection. If based on the property of (a) of these drawing 4 , and (b), the intensity of an incident light has not reached synchronizing signal output-level Vout of (b) on one or less level Vref at the time of synchronous detection of the beginning of the dotted-line view of (a). Therefore, the property of (a) of drawing 4 and (b) shows that a synchronous detection signal may be unable to generate depending on the state of the property of the synchronizing signal width of face by Vref, when incident-light intensity is weak that is,.
[0028] In this operation gestalt, in order to acquire the first synchronous detection signal, in case you turn on a laser diode by power usually smaller than the time of image formation, let Vref in a synchronous detection generation circuit be a usually different value from the time of image formation (Vref2 of drawing 3). It becomes possible to usually acquire the time of image formation, and the stable synchronous detection signal not changing by this composition. The detail of this composition is explained below.
[0029] The block diagram of the example 1 of circuitry of the <example 1 of circuitry> book operation gestalt is shown in drawing 5 , and the operation flow chart of the circuit is shown in drawing 6 . In Step S1 of drawing 6 , Vref2 is outputted by the D/A converter, and a polygon motor is started (S2). If it is Polygon RDY (S3/Y), it will be referred to as LDON, and if (S4) and the first motive land survey are IN(s) (S5), Vref2 will be outputted by the D/A converter (S6). Then, image formation operation is performed (S7).
[0030] Since it considers as a value which is usually different from the time of obtaining the first synchronizing signal from the time of a scanning means halt with software in this operation gestalt in the time of image formation as shown in drawing 3 - drawing 6 , the time of image formation and the stable synchronous detection signal not changing can usually be acquired.
[0031] The block diagram of the example 2 of circuitry of the <example 2 of circuitry> book operation gestalt is shown in drawing 7 , and the timing of the circuit of operation is shown in drawing 8 .
[0032] In order to acquire the first synchronous detection signal by the circuit of drawing 7 , in case a laser diode is turned on by power usually smaller than the time of image formation, it becomes [Vref=Vref2] in a synchronous detection generation circuit, and the stable synchronous detection signal can be acquired.
[0033] Usually, if it is set to [Vref=Vref1], image formation is completed and LD is turned off, it will become [Vref=Vref2] by the watch locking-dog output at the time of image formation, and the synchronous detection input of the beginning at the time of the next image formation will be equipped with it.
[0034] Thus, since it considers as a value which is usually different from the time of obtaining the first synchronizing signal from the time of a scanning means halt by hardware in this invention in the time of image formation, the time of image formation and the stable synchronous detection signal not changing can usually be acquired.
[0035] In addition, an above-mentioned operation gestalt is an example of suitable operation of this invention, and is not limited to this.
[0036]
[Effect of the Invention] the above explanation — the Ming kana — like, the image formation equipment of this invention controls the optical intensity of the laser beam injected from laser diode, scans a laser beam, and carries out image formation of the laser beam to a scan layer-ed as a laser spot The synchronizing signal which is formed in the position defined beforehand in

the image formation in this optical system, receives a laser beam, and defines recording start timing is generated, and in order to obtain the first synchronizing signal from the time of a halt of a scanning means, in case a laser diode is turned on, reference voltage within a synchronous detection means is made into a usually different value from the time of image formation. Therefore, in order to avoid that a toner is in the exposure line by lighting of the laser beam for obtaining the first synchronizing signal from the time of a scanning means halt, when usually making laser beam light intensity until it obtains the first synchronizing signal from a lighting start smaller than the time of image formation, it becomes certainly generable about the first synchronous detection signal.

[0037] Moreover, the reference voltage within a synchronous detection means is generated using a D/A converter etc., and it is considering as a value which is usually different from the time of obtaining the first synchronizing signal from the time of a halt of a scanning means with software in the time of image formation. Therefore, reference voltage is further changed arbitrarily with software, and correspondence becomes possible at change of the incident-light intensity to the control strip by aging etc.

[0038] Furthermore, reference voltage within a synchronous detection means is made into the value which usually differed from the time of obtaining the first synchronizing signal from the time of a halt of a scanning means in the time of image formation by hardware. Therefore, the first synchronous detection signal can be certainly generated with cheap composition, without increasing the time and effort of software by hardware further.

[Translation done.]

TECHNICAL FIELD

[The technical field to which invention belongs] Especially this invention relates to the image formation equipment applied to digital KOPIA which has the laser scanning optical system using laser diode, a LASER beam printer, etc. about image formation equipment.

[Translation done.]

PRIOR ART

[Description of the Prior Art] Conventionally, generally as for image formation equipment, high density and high speed are required. The demand of densification and improvement in the speed is becoming strong especially in recent years at the image formation equipment which has laser scanning optical system including a LASER beam printer. In order to meet the demand of this densification and improvement in the speed, it is necessary to raise the rotational frequency of the polygon motor which is a scanning means. The polygon motor dealing with high-speed rotation is developed by each motor maker now to meet this demand.
[0003] However, the problem that generation of heat of a bearing, a drive circuit, etc. will become large by this high-speed rotation correspondence, and the life of a motor will become short by this generation of heat has occurred. Moreover, since a polygon motor is rotated simultaneously with the power supply ON of a main part at the time of the normal operation of image formation equipment like a LASER beam printer and it continues rotating it henceforth to a power supply OFF, possibility that the life of a polygon motor will become below a main part life in that case arises.
[0004] Then, the method of using the early polygon motor of build up time, usually stopping a polygon motor, and making it rotate recently only at the time of image formation is also developed. According to this method, it becomes possible to develop the life of a polygon motor beyond a main part life.
[0005] Moreover, the synchronizing signal which defines recording start timing is needed for image formation. This synchronizing signal is generated by inputting a laser beam into the synchronous detection means prepared in the position defined beforehand, for example. In order to obtain the first synchronizing signal from the time of a polygon motor halt, after rotating a polygon motor and being in a regular rotation state first, a laser diode is turned on to arbitrary timing and it waits for the synchronizing signal from a synchronous detection means. Once, after detecting a synchronizing signal, fixed time Tw is counted from a synchronizing signal input, a laser diode is turned on after that, and a synchronizing signal may be repeated.
[0006] In this fixed time Tw, if a polygon motor sets Tl and laser diode lighting time for synchronizing signal detection to Td for the synchronizing signal input interval at the time of a regular rotation state, it will become [Tw=Tl-Td]. In here, as for the laser diode lighting time Td, it is common to set up so that the lighting start timing of a laser diode may be computed from the rotational speed of the geometric position by the optical-system layout of a synchronous detection means and a photo conductor and a polygon motor etc. and it may become the photo conductor field passage back in order to prevent degradation by unnecessary exposure of the photo conductor which is a scan layer-ed, and the imprint of a toner.
[0007] However, in order to obtain the first synchronizing signal from the time of a polygon motor halt, in case a laser diode is turned on, at the time of a halt of a polygon motor, an angle of rotation may become eye an unknown hatchet and arbitrary lighting timing, and may expose a photo conductor by one line at the maximum.
[0008] Since in the case of the method which rotates a polygon motor simultaneously with a power supply ON several 10s will be taken before units other than optical system, such as a fixing unit, usually start from a power supply ON, about unnecessary exposure of a maximum of

one line until it obtains the first synchronous detection, an electrostatic latent image will be eliminated according to an electric discharge process by preventing the imprint of a toner and rotating a photo conductor by turning off development. The time which this work takes becomes possible [starting optical system, by the time other units start, since it is about several / at most / s].

[0009] However, it leads to the fall of a throughput only at the time of image formation, and it is not desirable on a function. [of the time loss for several s by doing such work in the case of the method which rotates a polygon motor]

[0010] Moreover, when such work is not done, a toner is in an unnecessary exposure line, for example, in the case of the electrophotography process using the imprint roller etc., there is a possibility that an imprint roller may get and it may be connected with the dirt of a roller, as a result soiling on the back of a transfer paper, etc.

[0011] The laser beam scanned by Pld and the scan layer-ed in the optical intensity of the laser beam controlled by optical on-the-strength control means in order to avoid this. In case laser diode turns on in order to obtain the first synchronizing signal from the time of a scanning means halt when minimum light intensity required in order to generate a synchronous detection signal by the laser beam scanned by Pim and the synchronous detection means in the minimum light intensity for the formed electrostatic latent image developing sets to Pdt, the image-formation equipment which carries out [making laser-beam light intensity until it obtains the first synchronizing signal from a lighting start into [Pdt<=Pld<Pim], and] as the feature is invented.

[0012] A toner seems thus, not to be in the exposure for obtaining synchronous detection, if it controls.

[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention] the above explanation — the Ming kana — like, the image formation equipment of this invention controls the optical intensity of the laser beam injected from laser diode, scans a laser beam, and carries out image formation of the laser beam to a scan layer-ed as a laser spot The synchronizing signal which is formed in the position defined beforehand in the image formation in this optical system, receives a laser beam, and defines recording start timing is generated, and in order to obtain the first synchronizing signal from the time of a halt of a scanning means, in case a laser diode is turned on, reference voltage within a synchronous detection means is made into a usually different value from the time of image formation. Therefore, in order to avoid that a toner is in the exposure line by lighting of the laser beam for obtaining the first synchronizing signal from the time of a scanning means halt, when usually making laser beam light intensity until it obtains the first synchronizing signal from a lighting start smaller than the time of image formation, it becomes certainly generable about the first synchronous detection signal.
[0037] Moreover, the reference voltage within a synchronous detection means is generated using a D/A converter etc., and it is considering as a value which is usually different from the time of obtaining the first synchronizing signal from the time of a halt of a scanning means with software in the time of image formation. Therefore, reference voltage is further changed arbitrarily with software, and correspondence becomes possible at change of the incident-light intensity to the control strip by aging etc.
[0038] Furthermore, reference voltage within a synchronous detection means is made into the value which usually differed from the time of obtaining the first synchronizing signal from the time of a halt of a scanning means in the time of image formation by hardware. Therefore, the first synchronous detection signal can be certainly generated with cheap composition, without increasing the time and effort of software by hardware further.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, in such image formation equipment, in order to usually make laser beam light intensity until it obtains the first synchronizing signal from a lighting start smaller than the time of image formation, at the time of the dirt of a lens, and a system, the incident-light intensity to a control strip becomes weak by change etc., and it is accompanied by the problem with a possibility that a synchronous detection signal may be ungenerable.
[0014] this invention was made in view of such a point, and when usually making laser beam light intensity until it obtains the first synchronizing signal from a lighting start smaller than the time of image formation, it aims at offering the image formation equipment which can generate the first synchronous detection signal certainly.

[Translation done.]

MEANS

[Means for Solving the Problem] In order to attain this purpose, the image formation equipment of this invention The optical on-the-strength control means which are image formation equipment which develops the electrostatic latent image formed in the scan layer-ed of the laser spot according to a predetermined electrophotography process, and control the optical intensity of the laser beam injected from laser diode, A scanning means to scan a laser beam, and the image formation optical system which carries out image formation of the laser beam to a scan layer-ed as a laser spot, It has a synchronous detection means to generate the synchronizing signal which receives the laser beam prepared in the position defined beforehand, and defines recording start timing. In order to obtain the first synchronizing signal from the time of a halt of a scanning means, in case a laser diode is turned on, it is characterized by making reference voltage within a synchronous detection means into a usually different value from the time of image formation.
[0016] Moreover, it is good to consider as a value which is usually different from the time of generating the reference voltage within the above-mentioned synchronous detection means using a D/A converter etc., and obtaining the first synchronizing signal from the time of a halt of a scanning means with software in the time of image formation.
[0017] Furthermore, it is good to make reference voltage within a synchronous detection means into the value which usually differed from the time of obtaining the first synchronizing signal from the time of a halt of a scanning means in the time of image formation by hardware.
[0018]
[Embodiments of the Invention] Next, with reference to an accompanying drawing, the gestalt of operation of the image formation equipment by this invention is explained in detail. Reference of drawing 1 - drawing 8 shows 1 operation gestalt of the image formation equipment of this invention. Change of change of the PinPD output according [accord / a synchronizing signal generation circuit / the block composition of a LASER beam printer and drawing 3 / in (a) / drawing 1 / of these drawings / drawing 4] to incident-light intensity in the composition of laser scanning optical system and drawing 2 and the synchronizing signal width of face according [(b)] to Vref is expressed, respectively. Moreover, the block of the example 2 of circuitry of an operation gestalt is shown in the operation flow chart of the circuit, and drawing 7 , and the timing of the circuit of operation is shown in drawing 5 at drawing 8 at the block of the example 1 of circuitry of an operation gestalt, and drawing 6 , respectively.
[0019] Drawing 1 shows the outline block diagram of the laser scanning optical system applied to the image formation equipment of this operation gestalt. This laser scanning optical system has laser diode 10, a collimate lens 11, aperture 12, the 1st cylinder lens 13, polygon motor 14a, polygon mirror 14b, the ftheta lens 15, the 1st mirror 16, the 2nd cylinder lens 17, synchronous detection mirror 18a, synchronous detection cylinder lens 18b, optical fiber 18c, a photo conductor 19, etc., and is constituted.
[0020] An excessive laser beam is cut in the laser beam study system constituted by above-mentioned each part by the aperture 12 with the slit section according to the size of the dot which the laser beam by which outgoing radiation was carried out from laser diode 10 is made parallel light with a collimate lens 11, and is formed.

[0021] It is condensed so that a laser beam may become a size predetermined in a photo conductor 19 top with the 1st cylinder lens 13, and it is scanned by polygon mirror 14b which rotates by polygon motor 14a at main scanning direction (the direction of a major axis of a photo conductor 19) x. And ******** is changed into uniform motion with the ftheta lens 15 of a couple, and a curvature of field is amended.
[0022] Next, the angle of a laser beam is changed by the 1st mirror 16, the 2nd cylinder lens 17 performs condensing to the direction y of vertical scanning (hand of cut of a photo conductor 19), and it irradiates on a photo conductor 19.
[0023] Moreover, it is condensed by optical fiber 18c by synchronous detection cylinder lens 18b, photo electric translation is performed by PinPD (not shown) of a control board, and the laser beam reflected by synchronous detection mirror 18a serves as a synchronizing signal.
[0024] The block block diagram of LASER beam printer 20 is shown in drawing 2 as an example of the image formation equipment using the above-mentioned laser criminal-investigation optical system. In drawing 2 , the image data sent to LASER beam printer 20 via printer I/F22 from the host PC 21 is sent to the printer engine 24, after being developed by bit map information by the printer controller 23. The image data transmitted to the printer engine 24 is changed into the ON/OFF signal of the laser diode which made the synchronizing signal 32 the start reference signal by the engine control section 25, and is irradiated via the optical unit 28 to a photo conductor 34. Image formation is performed according to a known electrophotography process after that.
[0025] Here, the minimum light intensity required in order to generate a synchronizing signal 32 by the laser beam scanned by Pim and the synchronous detection means 31 in the minimum light intensity for the electrostatic latent image formed of the laser beam scanned by Pld and the photo conductor 34 developing the optical intensity of the laser beam controlled by the optical on-the-strength control section 26 according to the electrophotography process 33 is set to Pdt.
[0026] In this composition, in order to obtain an early synchronizing signal from the time of a scanning means halt, in case laser diode is turned on, laser beam light intensity until it obtains the first synchronizing signal from a lighting start is made into [Pdt<=Pld<Pim] by the optical on-the-strength control section 26. For this reason, development of the electrostatic latent image by the unnecessary exposure line is lost.
[0027] Change of the PinPD output according the example of composition of a synchronizing signal generation circuit to incident-light intensity and property change of the opposite time t of the synchronizing signal width of face by Vref are shown in drawing 3 again at drawing 4 . Vref1 and Vref2 of drawing 4 are the example of level of the strength of incident-light intensity. Moreover, the real diagram of half-ellipse type is usually property change at the time of image formation, and, similarly a dotted-line view is property change at the time of the first synchronous detection. If based on the property of (a) of these drawing 4 , and (b), the intensity of an incident light has not reached synchronizing signal output-level Vout of (b) on one or less level Vref at the time of synchronous detection of the beginning of the dotted-line view of (a). Therefore, the property of (a) of drawing 4 and (b) shows that a synchronous detection signal may be unable to generate depending on the state of the property of the synchronizing signal width of face by Vref, when incident-light intensity is weak that is,.
[0028] In this operation gestalt, in order to acquire the first synchronous detection signal, in case you turn on a laser diode by power usually smaller than the time of image formation, let Vref in a synchronous detection generation circuit be a usually different value from the time of image formation (Vref2 of drawing 3). It becomes possible to usually acquire the time of image formation, and the stable synchronous detection signal not changing by this composition. The detail of this composition is explained below.
[0029] The block diagram of the example 1 of circuitry of the <example 1 of circuitry> book operation gestalt is shown in drawing 5 , and the operation flow chart of the circuit is shown in drawing 6 . In Step S1 of drawing 6 , Vref2 is outputted by the D/A converter, and a polygon motor is started (S2). If it is Polygon RDY (S3/Y), it will be referred to as LDON, and if (S4) and the first motive land survey are IN(s) (S5), Vref2 will be outputted by the D/A converter (S6).

Then, image formation operation is performed (S7).
[0030] Since it considers as a value which is usually different from the time of obtaining the first synchronizing signal from the time of a scanning means halt with software in this operation gestalt in the time of image formation as shown in drawing 3 – drawing 6 , the time of image formation and the stable synchronous detection signal not changing can usually be acquired.
[0031] The block diagram of the example 2 of circuitry of the <example 2 of circuitry> book operation gestalt is shown in drawing 7 , and the timing of the circuit of operation is shown in drawing 8 .
[0032] In order to acquire the first synchronous detection signal by the circuit of drawing 7 , in case a laser diode is turned on by power usually smaller than the time of image formation, it becomes [Vref=Vref2] in a synchronous detection generation circuit, and the stable synchronous detection signal can be acquired.
[0033] Usually, if it is set to [Vref=Vref1], image formation is completed and LD is turned off, it will become [Vref=Vref2] by the watch locking-dog output at the time of image formation, and the synchronous detection input of the beginning at the time of the next image formation will be equipped with it.
[0034] Thus, since it considers as a value which is usually different from the time of obtaining the first synchronizing signal from the time of a scanning means halt by hardware in this invention in the time of image formation, the time of image formation and the stable synchronous detection signal not changing can usually be acquired.
[0035] In addition, an above-mentioned operation gestalt is an example of suitable operation of this invention, and is not limited to this.

[Translation done.]

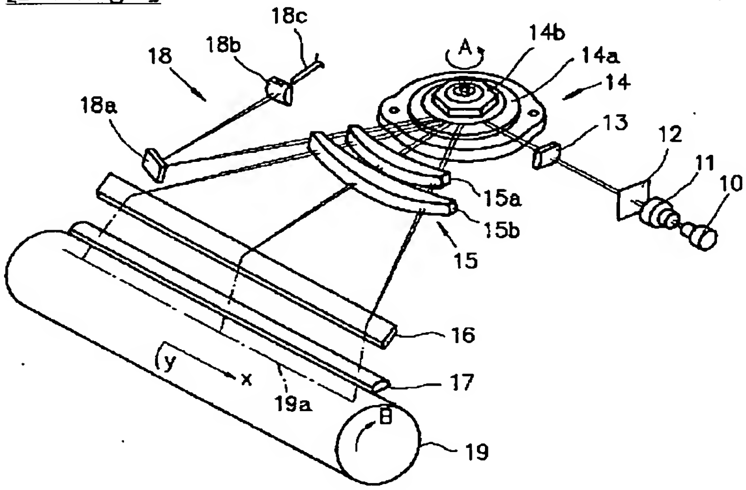
DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The outline composition of the laser scanning optical system applied to the image formation equipment of this invention is shown.
[Drawing 2] The block block diagram of the LASER beam printer as an example of the image formation equipment using laser criminal-investigation optical system is shown.
[Drawing 3] The example of composition of a synchronizing signal generation circuit is shown.
[Drawing 4] Property change of the opposite time t of the synchronizing signal width of face by Vref is shown in (a) at change of the PinPD output by incident-light intensity, and (b).
[Drawing 5] The block diagram of the example 1 of circuitry of the operation gestalt of this invention is shown.
[Drawing 6] The operation flow chart of the example 1 of circuitry is shown.
[Drawing 7] The block diagram of the example 2 of circuitry of the operation gestalt of this invention is shown.
[Drawing 8] The timing of the example 2 of circuitry of operation is shown.
[Description of Notations]
10 Laser Diode
11 Collimate Lens
12 Aperture
13 1st Cylinder Lens
14a Polygon motor
14b Polygon mirror
15 FTheta Lens
16 1st Mirror
17 2nd Cylinder Lens
18a Synchronous detection mirror
18b Synchronous detection cylinder lens
18c Optical fiber
19 Photo Conductor
20 LASER Beam Printer
21 Host PC
22 Printer L/F
23 Printer Controller
24 Printer Engine
25 Engine Control Section
26 Optical on-the-Strength Control Section
28 Optical Unit
31 Synchronous Detection Means
32 Synchronizing Signal
33 Electrophotography Process
34 Photo Conductor

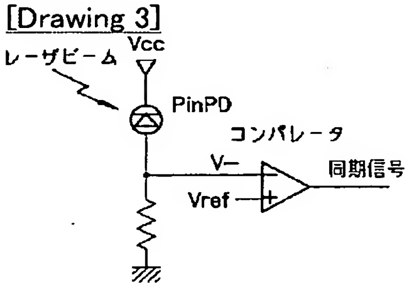
[Translation done.]

DRAWINGS

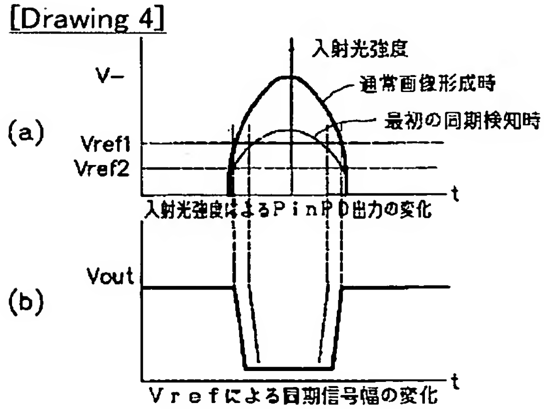
[Drawing 1]



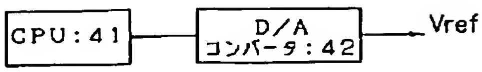
[Drawing 3]



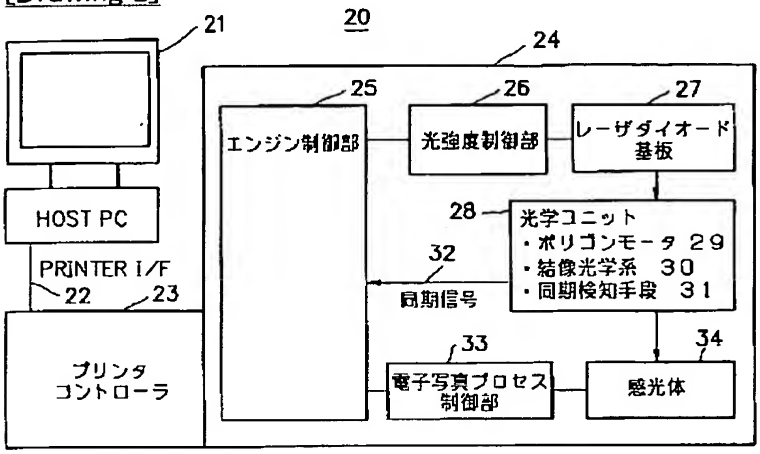
[Drawing 4]



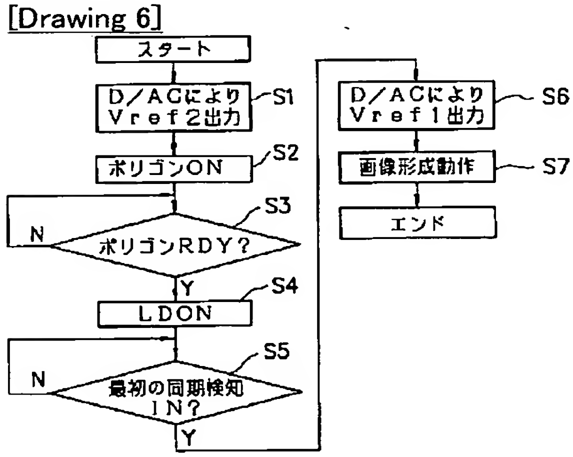
[Drawing 5]



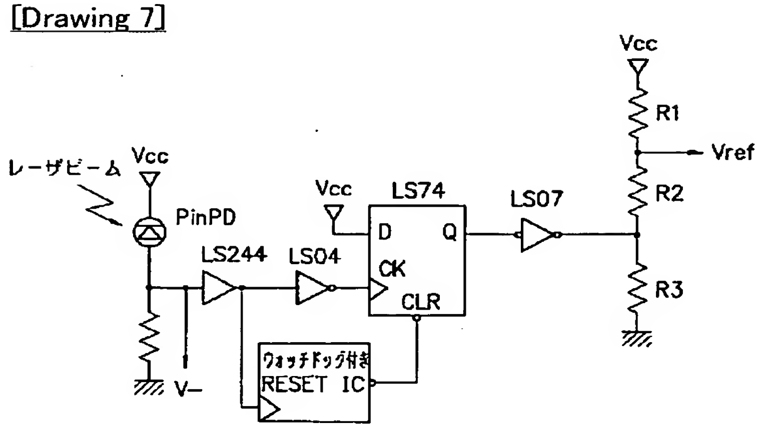
[Drawing 2]



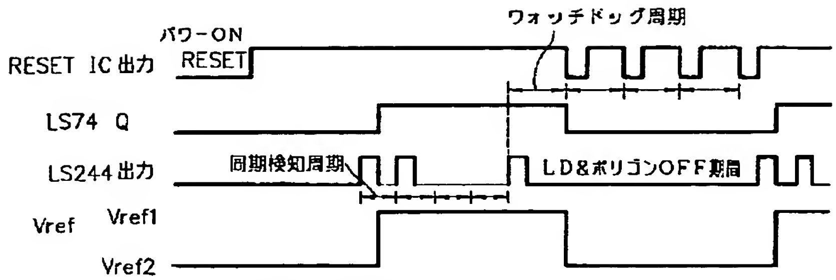
[Drawing 6]



[Drawing 7]



[Drawing 8]



ウォッチドッグ周期>同期検知周期
Vref1=(R2+R3)/(R1+R2+R3)
Vref2=R2/(R1+R2)

[Translation done.]

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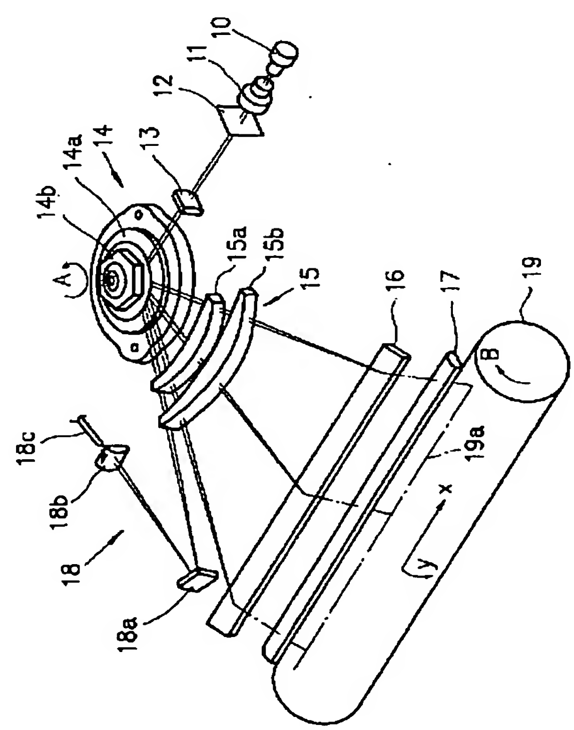
(54)【発明の名称】画像形成装置

(57)【要約】

【課題】　点灯開始から最初の同期信号を得るまでのレーザビーム光強度を通常画像形成時よりも小さくする場合においても、最初の同期検知信号を確実に生成できる画像形成装置を得る。

【解決手段】　ポリゴンミラー１４ｂにより主走査方向ｘに、また第２シリンダレンズ１７により副走査方向ｙへの集光を行い感光体１９上に照射する。同期検知ミラー１８ａによって反射されたレーザビームは、同期検知シリンダレンズ１８ｂにより光ファイバ１８ｃに集光され、制御基板のＰｉｎＰＤにより光電変換が行われ同期信号となる。本構成において、走査手段停止時から初期の同期信号を得るためにレーザダイオードを点灯する際、点灯開始から最初の同期信号を得るまでのレーザビーム光強度を、［最小光強度Ｐｄｔ≦レーザビームの光強度Ｐｌｄ＜顕像化するための最小光強度Ｐｉｍ］とする。このため、不要な露光ラインによる静電潜像の顕像化がなくなる。



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【特許請求の範囲】

【請求項1】　被走査面にレーザスポットにより形成された静電潜像を所定の電子写真プロセスにより顕像化する画像形成装置において、

レーザダイオードより射出されるレーザビームの光強度を制御する光強度制御手段と、

前記レーザビームを走査する走査手段と、

前記レーザビームを前記被走査面にレーザスポットとして結像する結像光学系と、

予め定められた位置に設けられた前記レーザビームを受光して記録開始タイミングを定める同期信号を発生する同期検知手段とを有し、

前記走査手段の停止時から最初の同期信号を得るためにレーザダイオードを点灯する際は、前記同期検知手段内の基準電圧を通常画像形成時とは異なった値とすることを特徴とする画像形成装置。

【請求項2】　請求項1の画像形成装置において、前記同期検知手段内の基準電圧をD／Aコンバータ等を用いて発生させ、ソフトウェアにより前記走査手段の停止時から最初の同期信号を得る時と、通常画像形成時とで異なった値とすることを特徴とする画像形成装置。

【請求項3】　請求項1の画像形成装置において、前記同期検知手段内の基準電圧をハードウェアにより、前記走査手段の停止時から最初の同期信号を得る時と通常画像形成時とで異なった値とすることを特徴とする画像形成装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、画像形成装置に関し、特に、レーザダイオードを用いたレーザ走査光学系を有するデジタルコピア、レーザプリンタ等に適用される画像形成装置に関する。

【0002】

【従来の技術】従来、画像形成装置は一般に、高密度、高速度が要求される。特に近年、レーザプリンタをはじめとするレーザ走査光学系を有する画像形成装置には、高密度化、高速化の要求が強くなってきている。この高密度化、高速化の要求に応えるためには、走査手段であるポリゴンモータの回転数を高める必要がある。この要求に応えるべく現在、各モータメーカによって高速回転対応のポリゴンモータが開発されている。

【0003】しかし、この高速回転対応によって、軸受け、駆動回路等の発熱が大きくなり、この発熱によってモータの寿命が短くなってしまうという問題が発生している。また、レーザプリンタのような画像形成装置の通常動作時は、本体の電源ONと同時にポリゴンモータを回転させ、以降電源OFFまで回転させ続けるので、その場合ポリゴンモータの寿命が本体寿命以下となってしまう可能性が生じる。

【0004】そこで、最近は、立ち上がり時間の早いポリゴンモータを使用し、通常はポリゴンモータを停止させ画像形成時のみ回転させるという方式も開発されている。この方式によれば、本体寿命以上にポリゴンモータの寿命を伸ばすことが可能となる。

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【0005】また、画像形成には記録開始タイミングを定める同期信号が必要となる。この同期信号は、例えば、予め定められた位置に設けられた同期検知手段にレーザビームを入力することにより発生する。ポリゴンモータ停止時から最初の同期信号を得るためには、まず、ポリゴンモータを回転させ定常回転状態となった後、任意のタイミングでレーザダイオードを点灯し、同期検知手段からの同期信号を待つ。一旦、同期信号が検知された以降は同期信号入力から一定時間Twをカウントし、その後レーザダイオードを点灯し、同期信号を繰り返し得る。

【0006】この一定時間Twとは、ポリゴンモータが定常回転状態時の同期信号入力間隔をT1、同期信号検知用のレーザダイオード点灯時間をTdとすると、［Tw＝T1－Td］となる。ここにおいて、レーザダイオード点灯時間Tdは、被走査面である感光体の不要な露光による劣化およびトナーの転写を防ぐため、レーザダイオードの点灯開始タイミングを、同期検知手段および感光体の光学系レイアウトによる幾何学的位置およびポリゴンモータの回転速度等より算出し、感光体領域通過後となるように設定するのが一般的である。

【0007】しかしながら、ポリゴンモータ停止時から最初の同期信号を得るためにレーザダイオードを点灯する際は、ポリゴンモータの停止時回転角が不明なため、任意の点灯タイミングとなってしまい最大で1ライン分感光体を露光してしまう可能性がある。

【0008】電源ONと同時にポリゴンモータを回転させる方式の場合は、通常電源ONから定着ユニット等光学系以外のユニットが立ち上がるまでに数10sかかるので、最初の同期検知を得るまでの最大1ラインの不要な露光については、現像をOFFすることにより、トナーの転写を防ぎ、また感光体を回転させることによって除電プロセスにより静電潜像を消去してしまう。この作業に要する時間は、せいぜい数s程度であるので、他のユニットが立ち上がるまでに光学系を立ち上げることが可能となる。

【0009】しかしながら、画像形成時のみポリゴンモータを回転させる方式の場合は、このような作業を行うことによる数sのタイムロスはスループットの低下につながり、機能上好ましくない。

【0010】また、このような作業を行わなかった場合は不要な露光ラインにトナーがのってしまい、たとえば転写ローラ等を用いた電子写真プロセスの場合は、転写ローラがのりローラの汚れ、ひいては転写紙の裏汚れ等につながる恐れがある。

【0011】これを避けるために、光強度制御手段によ

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って制御したレーザビームの光強度をＰｌｄ、被走査面に走査されたレーザビームによって形成された静電潜像が顕像化するための最小光強度をＰｉｍ、同期検知手段に走査されたレーザビームによって同期検知信号を発生させるために必要な最小光強度をＰｄｔとした時、走査手段停止時から最初の同期信号を得るためにレーザダイオードを点灯する際は、点灯開始から最初の同期信号を得るまでのレーザビーム光強度を［Ｐｄｔ≦Ｐｌｄ＜Ｐｉｍ］とすることを特徴とする画像形成装置が発明されている。

【００１２】このように制御を行えば同期検知を得るための露光にトナーがのるようなことはない。

【００１３】

【発明が解決しようとする課題】しかしながら、このような画像形成装置においては、点灯開始から最初の同期信号を得るまでのレーザビーム光強度を通常画像形成時よりも小さくするため、レンズの汚れ、系時変化等によっては制御板への入射光強度が弱くなり、同期検知信号を生成できない恐れがある問題を伴う。

【００１４】本発明は、このような点に鑑みてなされたもので、点灯開始から最初の同期信号を得るまでのレーザビーム光強度を通常画像形成時よりも小さくする場合においても、最初の同期検知信号を確実に生成できる画像形成装置を提供することを目的とする。

【００１５】

【課題を解決するための手段】かかる目的を達成するため、本発明の画像形成装置は、被走査面にレーザスポットにより形成された静電潜像を所定の電子写真プロセスにより顕像化する画像形成装置であり、レーザダイオードより射出されるレーザビームの光強度を制御する光強度制御手段と、レーザビームを走査する走査手段と、レーザビームを被走査面にレーザスポットとして結像する結像光学系と、予め定められた位置に設けられたレーザビームを受光して記録開始タイミングを定める同期信号を発生する同期検知手段とを有し、走査手段の停止時から最初の同期信号を得るためにレーザダイオードを点灯する際は、同期検知手段内の基準電圧を通常画像形成時とは異なった値とすることを特徴としている。

【００１６】また、上記の同期検知手段内の基準電圧をＤ／Ａコンバータ等を用いて発生させ、ソフトウェアにより走査手段の停止時から最初の同期信号を得る時と、通常画像形成時とで異なった値とするとよい。

【００１７】さらに、同期検知手段内の基準電圧をハードウェアにより、走査手段の停止時から最初の同期信号を得る時と通常画像形成時とで異なった値とするとよい。

【００１８】

【発明の実施の形態】次に添付図面を参照して本発明による画像形成装置の実施の形態を詳細に説明する。図１～図８を参照すると本発明の画像形成装置の一実施形態が示されている。これらの図の図１はレーザ走査光学系の構成、図２はレーザプリンタのブロック構成、図３は同期信号生成回路、図４は（ａ）が入射光強度によるＰｉｎＰＤ出力の変化および（ｂ）がＶｒｅｆによる同期信号幅の変化をそれぞれ表している。また、図５に実施形態の回路構成例１のブロック、図６にその回路の動作フローチャート、図７に実施形態の回路構成例２のブロック、図８にその回路の動作タイミングをそれぞれ示す。

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【００１９】図１は、本実施形態の画像形成装置に適用されるレーザ走査光学系の概略構成図を示している。本レーザ走査光学系は、レーザダイオード１０、コリメートレンズ１１、アパーチャ１２、第１シリンダレンズ１３、ポリゴンモータ１４ａ、ポリゴンミラー１４ｂ、ｆθレンズ１５、第１ミラー１６、第２シリンダレンズ１７、同期検知ミラー１８ａ、同期検知シリンダレンズ１８ｂ、光ファイバ１８ｃ、感光体１９、等を有して構成される。

【００２０】上記の各部により構成されるレーザ光学系において、レーザダイオード１０から出射されたレーザビームは、コリメートレンズ１１により平行光にされて形成するドットの大きさに応じたスリット部をもつアパーチャ１２により、余分なレーザビームがカットされる。

【００２１】第１シリンダレンズ１３によりレーザビームは、感光体１９上で所定の大きさになるように集光され、ポリゴンモータ１４ａで回転されるポリゴンミラー１４ｂにより、主走査方向（感光体１９の長軸方向）ｘに走査される。そして、一対のｆθレンズ１５により等角運動を等速運動に変換し、また像面湾曲を補正する。

【００２２】次に、第１ミラー１６によりレーザビームの角度を変えて第２シリンダレンズ１７により副走査方向（感光体１９の回転方向）ｙへの集光を行い、感光体１９上に照射する。

【００２３】また、同期検知ミラー１８ａによって反射されたレーザビームは同期検知シリンダレンズ１８ｂにより光ファイバ１８ｃに集光され、制御基板のＰｉｎＰＤ（図示せず）により光電変換が行われ、同期信号となる。

【００２４】図２に、上記のレーザ捜査光学系を用いた画像形成装置の一例として、レーザプリンタ２０のブロック構成図を示す。図２において、ホストＰＣ２１からプリンタＩ／Ｆ２２を経由してレーザプリンタ２０に送られた画像データは、プリンタコントローラ２３によってビットマップ情報に展開された後、プリンタエンジン２４に送られる。プリンタエンジン２４へ転送された画像データは、エンジン制御部２５によって同期信号３２を開始基準信号としたレーザダイオードのＯＮ／ＯＦＦ信号に変換され、光学ユニット２８を経由して感光体３４へ照射される。その後は既知の電子写真プロセスによ

って画像形成が実行される。

【００２５】ここで、光強度制御部２６によって制御したレーザビームの光強度をＰｌｄ、感光体３４に走査されたレーザビームによって形成された静電潜像が電子写真プロセス３３によって顕像化するための最小光強度をＰｉｍ、同期検知手段３１に走査されたレーザビームによって同期信号３２を発生させるために必要な最小光強度をＰｄｔとする。

【００２６】本構成の場合は、走査手段停止時から初期の同期信号を得るためにレーザダイオードを点灯する際、点灯開始から最初の同期信号を得るまでのレーザビーム光強度を光強度制御部２６によって、［Ｐｄｔ≦Ｐｌｄ＜Ｐｉｍ］とする。このため、不要な露光ラインによる静電潜像の顕像化がなくなる。

【００２７】図３に同期信号生成回路の構成例を、また、図４に入射光強度によるＰｉｎＰＤ出力の変化およびＶｒｅｆによる同期信号幅の対時間ｔの特性変化を示す。図４のＶｒｅｆ１およびＶｒｅｆ２は、入射光強度の強弱のレベル例である。また、半楕円形の実線図は通常画像形成時の特性変化であり、同じく点線図は最初の同期検知時の特性変化である。これら、図４の（ａ）および（ｂ）の特性に基づけば、（ａ）の点線図の最初の同期検知時に入射光の強度がレベルＶｒｅｆ１以下では、（ｂ）の同期信号出力レベルＶｏｕｔに達していない。よって、図４の（ａ）および（ｂ）の特性から、入射光強度が弱い場合には、つまりＶｒｅｆによる同期信号幅の特性の状態によっては、同期検知信号が生成できない可能性のあることがわかる。

【００２８】本実施形態においては、最初の同期検知信号を得るために、レーザダイオードを通常画像形成時より小さいパワーで点灯する際は、同期検知生成回路内のＶｒｅｆを通常画像形成時とは異なった値（図３のＶｒｅｆ２）とする。本構成によって、通常画像形成時と変わらない安定した同期検知信号を得ることが可能となる。本構成の詳細を以下に説明する。

【００２９】<回路構成例１>本実施形態の回路構成例１のブロック図を図５に、またその回路の動作フローチャートを図６に示す。図６のステップＳ１においてＤ／ＡコンバータによりＶｒｅｆ２を出力し、ポリゴンモータを起動させる（Ｓ２）。ポリゴンＲＤＹであれば（Ｓ３／Ｙ）、ＬＤＯＮとし（Ｓ４）、最初の動機検地がＩＮであれば（Ｓ５）、Ｄ／ＡコンバータによりＶｒｅｆ２を出力する（Ｓ６）。その後、画像形成動作を実行する（Ｓ７）。

【００３０】図３～図６に示すように、本実施形態においてはソフトウェアにより走査手段停止時から最初の同期信号を得る時と、通常画像形成時とで異なった値とするので、通常画像形成時と変わらない安定した同期検知信号を得ることができる。

【００３１】<回路構成例２>本実施形態の回路構成例２のブロック図を図７に、またその回路の動作タイミングを図８に示す。

【００３２】図７の回路により最初の同期検知信号を得るためにレーザダイオードを通常画像形成時より小さいパワーで点灯する際は同期検知生成回路内の［Ｖｒｅｆ＝Ｖｒｅｆ２］となり、安定した同期検知信号を得ることができる。

【００３３】通常画像形成時は［Ｖｒｅｆ＝Ｖｒｅｆ１］にセットされ、画像形成が終了し、ＬＤがｏｆｆされるとウォッチドッグ出力により［Ｖｒｅｆ＝Ｖｒｅｆ２］となり、次の画像形成時の最初の同期検知入力に備える。

【００３４】このように、本発明においてはハードウェアにより走査手段停止時から最初の同期信号を得る時と通常画像形成時とで異なった値とするので、通常画像形成時と変わらない安定した同期検知信号を得ることができる。

【００３５】尚、上述の実施形態は本発明の好適な実施の一例であり、これに限定されるものではない。

【００３６】

【発明の効果】以上の説明より明かなように、本発明の画像形成装置は、レーザダイオードより射出されるレーザビームの光強度を制御し、レーザビームを走査し、レーザビームを被走査面にレーザスポットとして結像する。この光学系における結像において、予め定められた位置に設けられレーザビームを受光して記録開始タイミングを定める同期信号を発生し、走査手段の停止時から最初の同期信号を得るためにレーザダイオードを点灯する際は、同期検知手段内の基準電圧を通常画像形成時とは異なった値としている。よって、走査手段停止時から最初の同期信号を得るためのレーザビームの点灯による露光ラインにトナーがのることを避けるため、点灯開始から最初の同期信号を得るまでのレーザビーム光強度を通常画像形成時よりも小さくする場合においても、最初の同期検知信号を確実に生成が可能となる。

【００３７】また、同期検知手段内の基準電圧をＤ／Ａコンバータ等を用いて発生させ、ソフトウェアにより走査手段の停止時から最初の同期信号を得る時と、通常画像形成時とで異なった値としている。よって、更にソフトウェアにより任意に基準電圧を変化させ、経時変化等による制御板への入射光強度の変化に対応が可能となる。

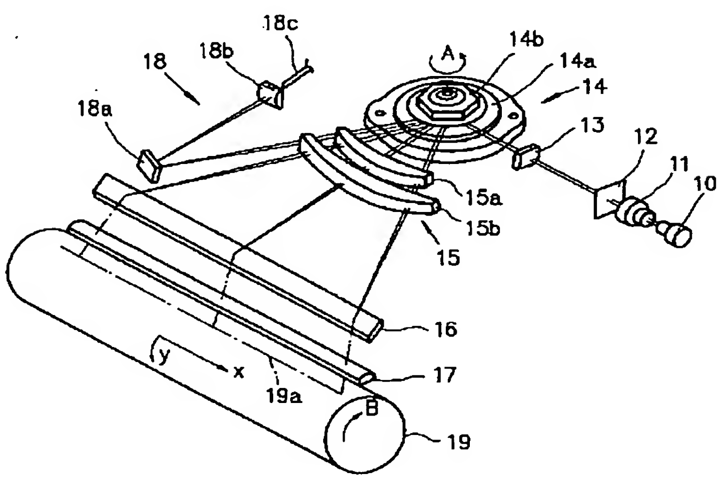
【００３８】さらに、同期検知手段内の基準電圧をハードウェアにより、走査手段の停止時から最初の同期信号を得る時と通常画像形成時とで異なった値としている。よって、更にハードウェアによりソフトウェアの手間を増やすことなく、安価な構成で最初の同期検知信号を確実に生成できる。

【図面の簡単な説明】

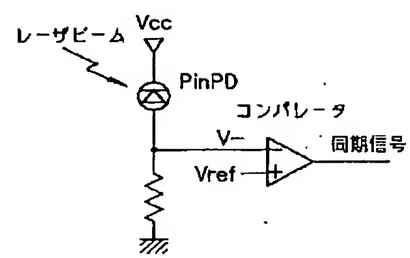
【図１】本発明の画像形成装置に適用されるレーザ走査

光学系の概略構成を示す。
【図２】レーザ捜査光学系を用いた画像形成装置の一例としてのレーザプリンタのブロック構成図を示す。
【図３】同期信号生成回路の構成例を示す。
【図４】（ａ）に入射光強度によるＰｉｎＰＤ出力の変化および（ｂ）にＶｒｅｆによる同期信号幅の対時間ｔの特性変化を示す。
【図５】本発明の実施形態の回路構成例１のブロック図を示す。
【図６】回路構成例１の動作フローチャートを示す。
【図７】本発明の実施形態の回路構成例２のブロック図を示す。
【図８】回路構成例２の動作タイミングを示す。
【符号の説明】
１０　レーザダイオード
１１　コリメートレンズ
１２　アパーチャ
１３　第１シリンダレンズ
１４ａ　ポリゴンモータ
１４ｂ　ポリゴンミラー
１５　ｆθレンズ
１６　第１ミラー
１７　第２シリンダレンズ
１８ａ　同期検知ミラー
１８ｂ　同期検知シリンダレンズ
１８ｃ　光ファイバ
１９　感光体
２０　レーザプリンタ
２１　ホストＰＣ
２２　プリンタ１／Ｆ
２３　プリンタコントローラ
２４　プリンタエンジン
２５　エンジン制御部
２６　光強度制御部′
２８　光学ユニット
３１　同期検知手段
３２　同期信号
３３　電子写真プロセス
３４　感光体

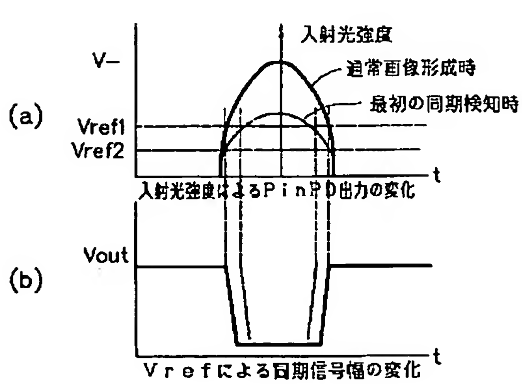
【図１】



【図３】

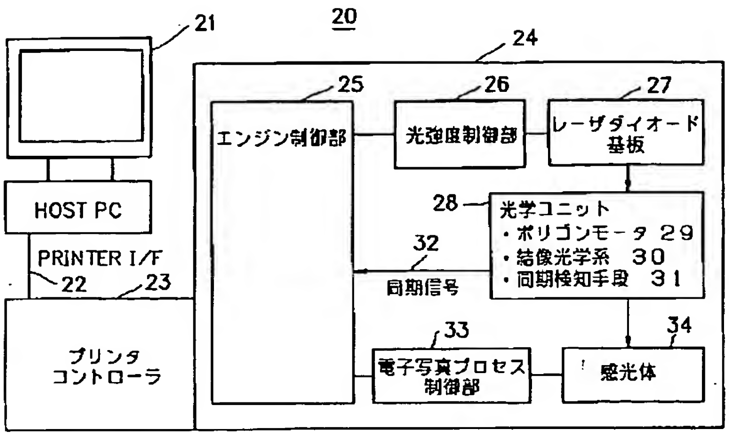


【図４】

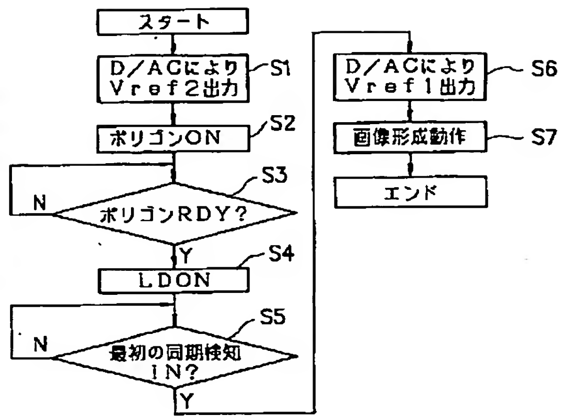


【図５】

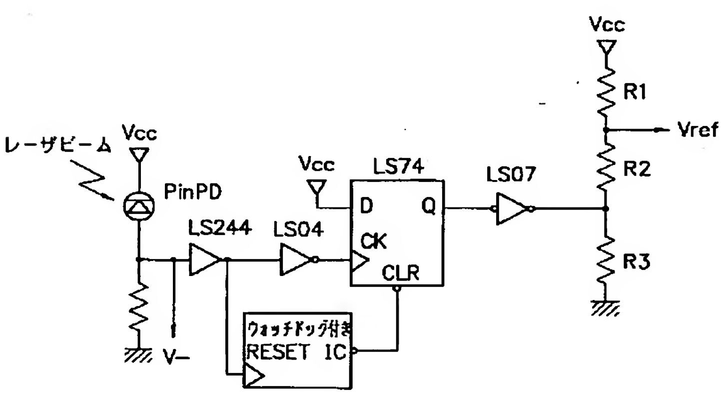
【図２】


20
21
HOST PC
PRINTER I/F
22
23
プリンタ
コントローラ
24
25
エンジン制御部
26
光強度制御部
27
レーザダイオード
基板
28
光学ユニット
・ポリゴンモータ 29
・結像光学系 30
・同期検知手段 31
32
同期信号
33
電子写真プロセス
制御部
34
感光体

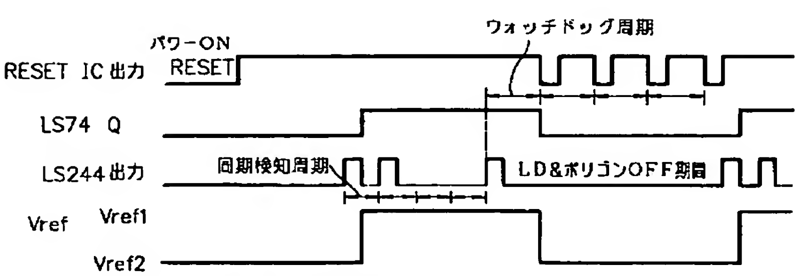
【図６】


スタート
D/ACにより
Vref2出力
S1
ポリゴンON
S2
ポリゴンRDY?
S3
N
Y
LDON
S4
最初の同期検知
IN?
S5
N
Y
D/ACにより
Vref1出力
S6
画像形成動作
S7
エンド

【図７】


レーザビーム
Vcc
PinPD
LS244
LS04
Vcc
LS74
D
Q
CK
CLR
ウォッチドッグ付き
RESET IC
V−
LS07
Vcc
R1
Vref
R2
R3

【図８】


パワーON
RESET
RESET IC出力
ウォッチドッグ周期
LS74 Q
LS244出力
同期検知周期
LD&ポリゴンOFF期間
Vref
Vref1
Vref2
ウォッチドッグ周期>同期検知周期
Vref1=(R2+R3)/(R1+R2+R3)
Vref2=R2/(R1+R2)